Fort Detrick Air Program

National Ambient Air Quality Standards

SOx NOx PM-10 CO Lead VOCs

Byproducts of combustion of fossil fuels

$C_xH_y + O_2 + N_2 \longrightarrow CO_2 + H_2O + N_2$

Fuels, coal contain sulfur (S), which form SO_x

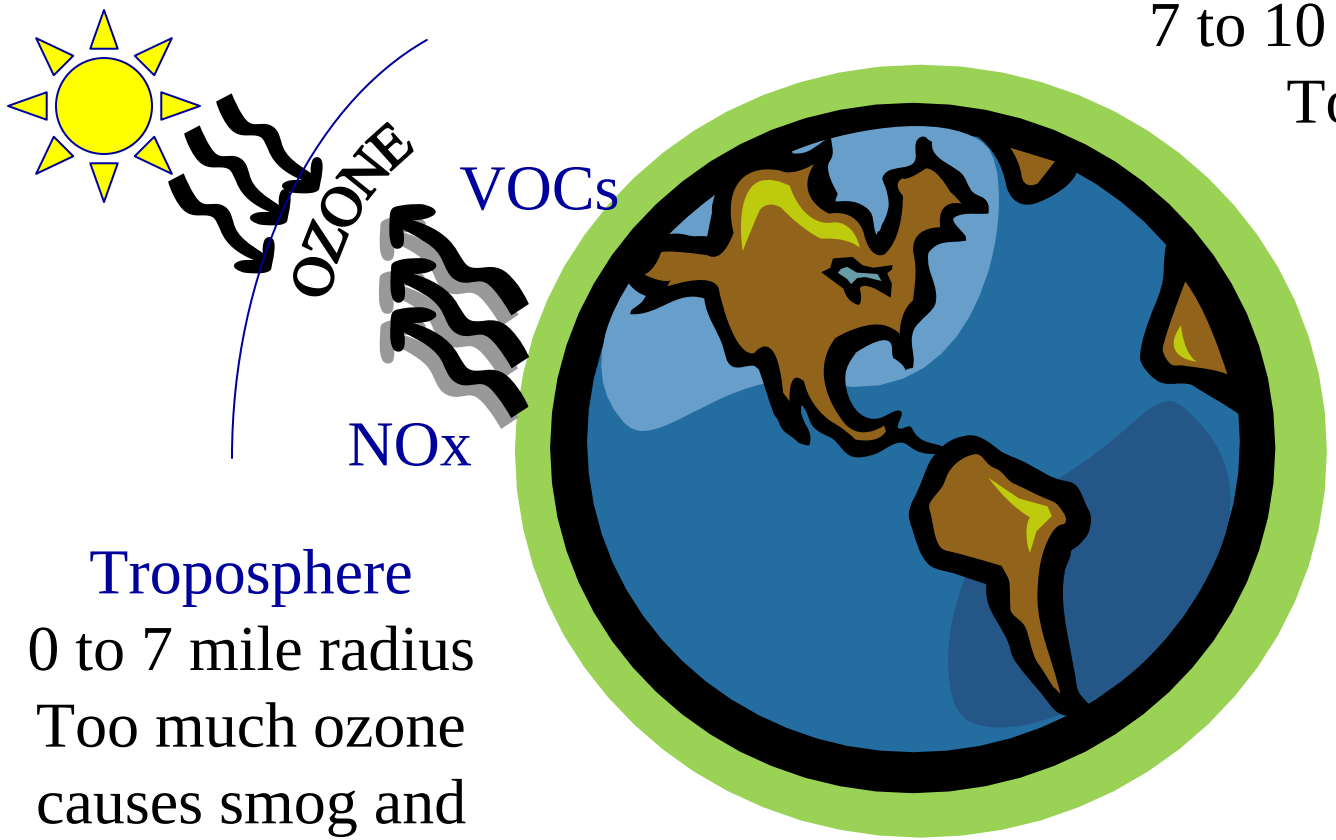
Found in gasoline

Ground-level Ozone

N_2 combines with O_2 to form NO_x

VOCs: volatile organic compounds-- organic compounds that photochemically react

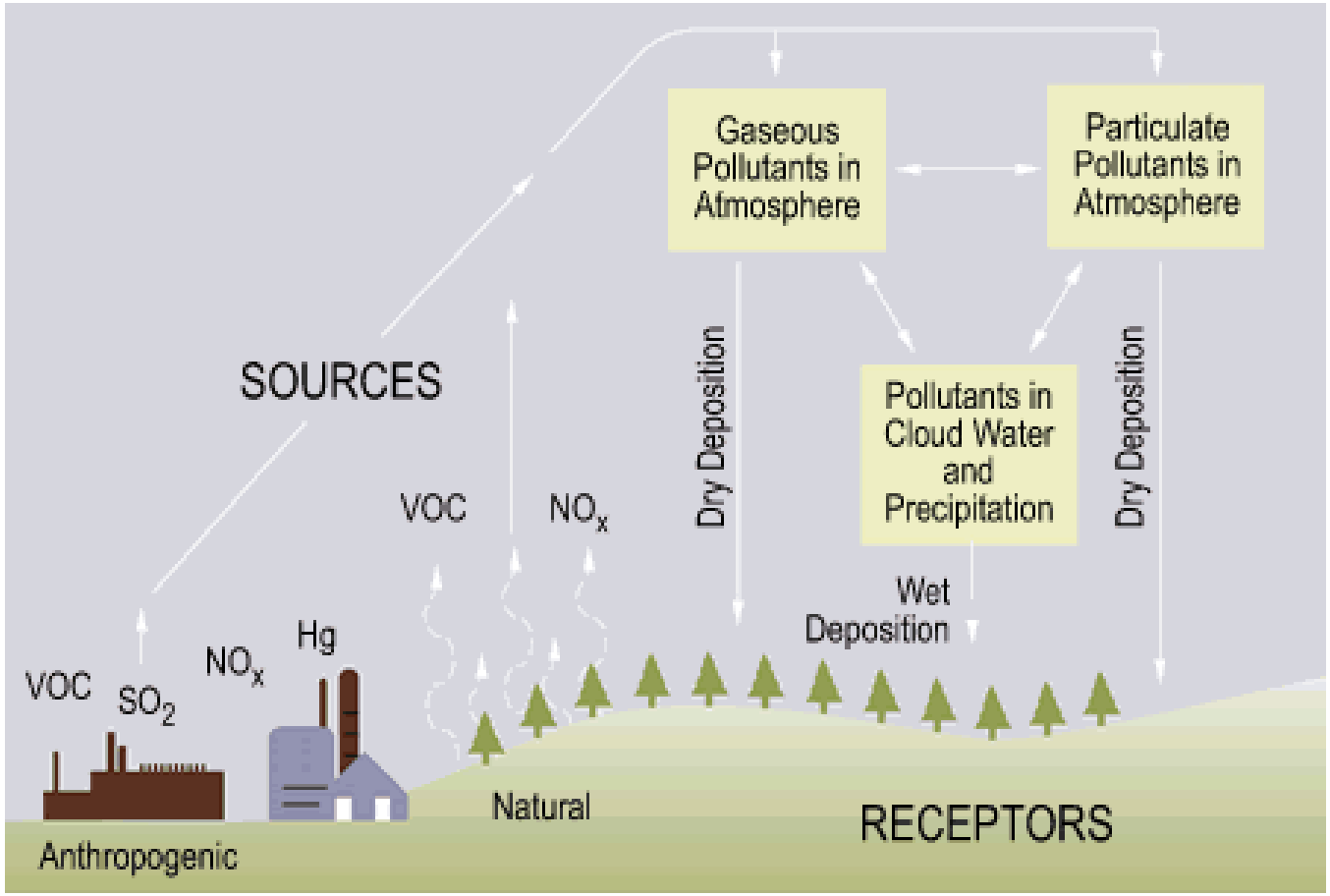
The Ozone Issue



Stratosphere
7 to 10 miles around Earth
Too little ozone
reduces UV
protection

Troposphere
0 to 7 mile radius
Too much ozone
causes smog and
lung damage

Smog = Acid Rain



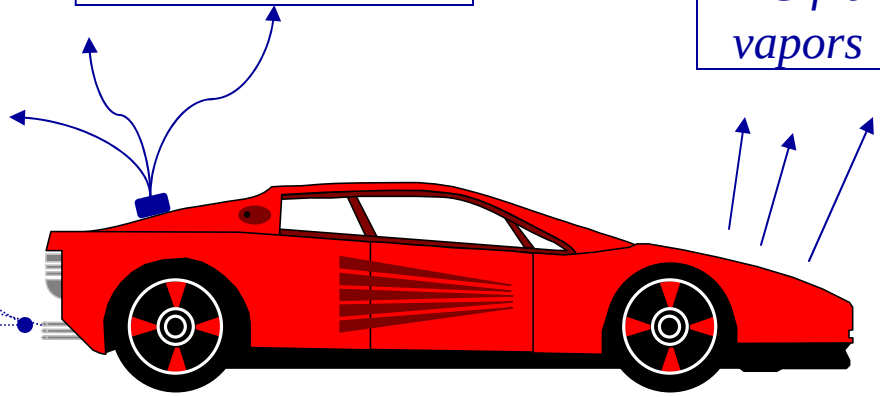
Smog Also = Ground-level Ozone

Mobile Sources = Ground-level Ozone

* Refueling Losses--ozone
HC from gasoline vapors

* Evaporative Emissions--ozone
HC from gasoline vapors

* Exhaust Emissions from combustion
HC--ozone
NOx--ozone, acid rain
CO--unhealthy
CO_2--green-house gas



Perfect combustion:

FUEL (HCs) + AIR (O_2, N_2) → CO_2 + H_2O + N_2

Real combustion:

FUEL + AIR → UNBURNED HCs + NO_x + CO + CO_2 + H_2O

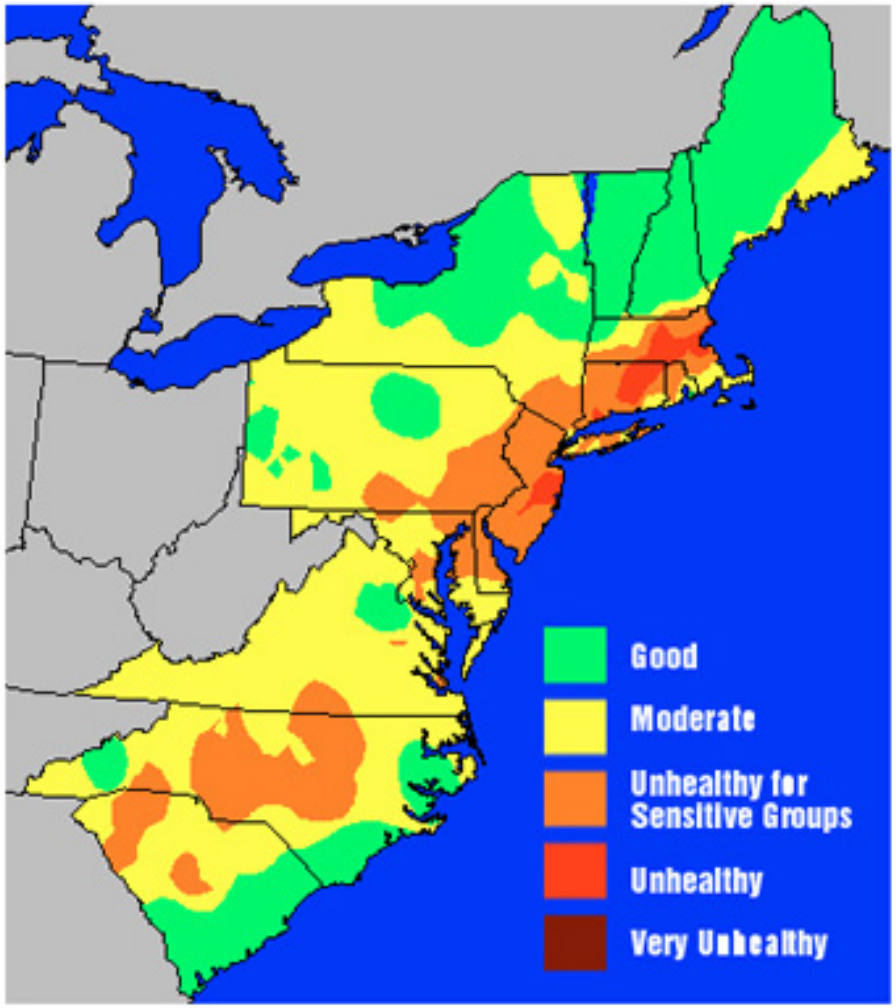
Top Ground-level Ozone Sources in Maryland

#2
Automobiles
90 tons/day NOx
120 tons/day VOCs

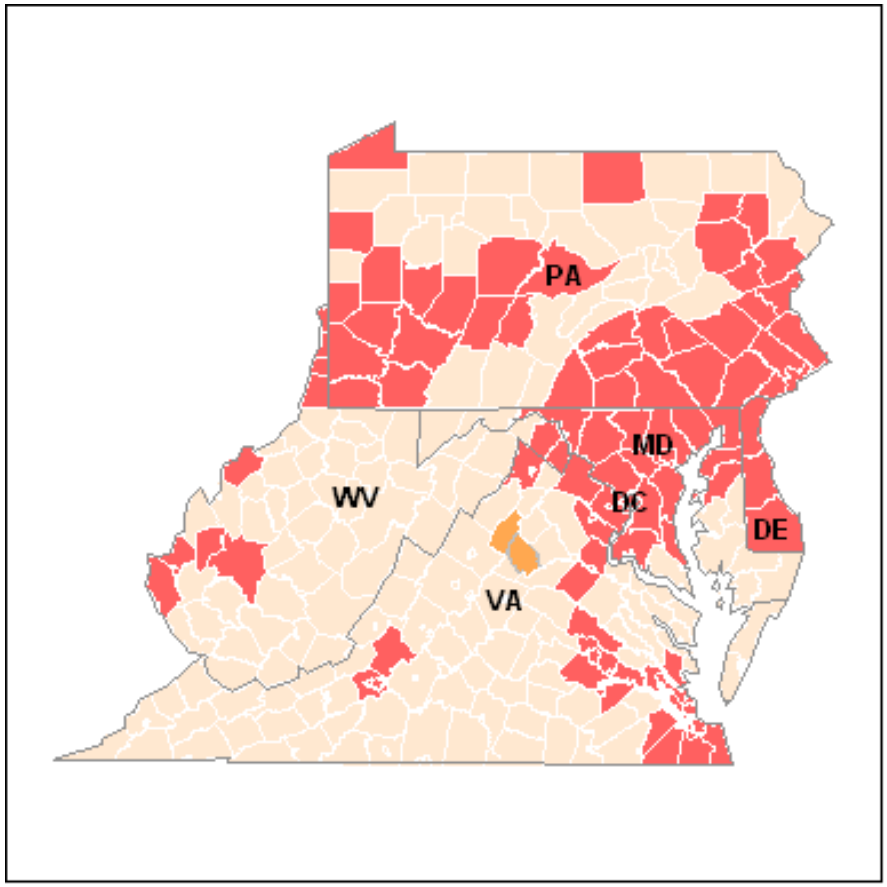
#1
Power Plants
180 tons/day NOx

#3
Diesel Trucks
55 tons/day NOx

Ozone Action Days



Ground-Level Ozone Non-attainment Areas



8-Hour Ozone Designations
April 15, 2004

- Unclassifiable/Attainment
- Nonattainment
- Nonattainment (part county)
- Unclassifiable

Solutions

What is Fort Detrick doing to decrease ground-level ozone and acid rain?

Incinerator Plant

- Existing scrubbers & upgrades
- Electronic controls upgrades
- Continuous monitoring
- Energy recovery
- Waste segregation
- Recycling
- Reducing waste stream
- Training

Boiler Plant

- More efficient & lower emitting boilers
- Natural gas & low-sulfur fuel
- Upgraded monitoring & control systems
- Future use of Central Utilities Plant
- Training

Emergency Generators & Boilers

- Low-sulfur fuel
- Operational limits
- Installed modulators
- Future use of B-20 and ultra-low-sulfur fuel
- Future steam load reduction
- Training

Alternate Fuel Vehicles

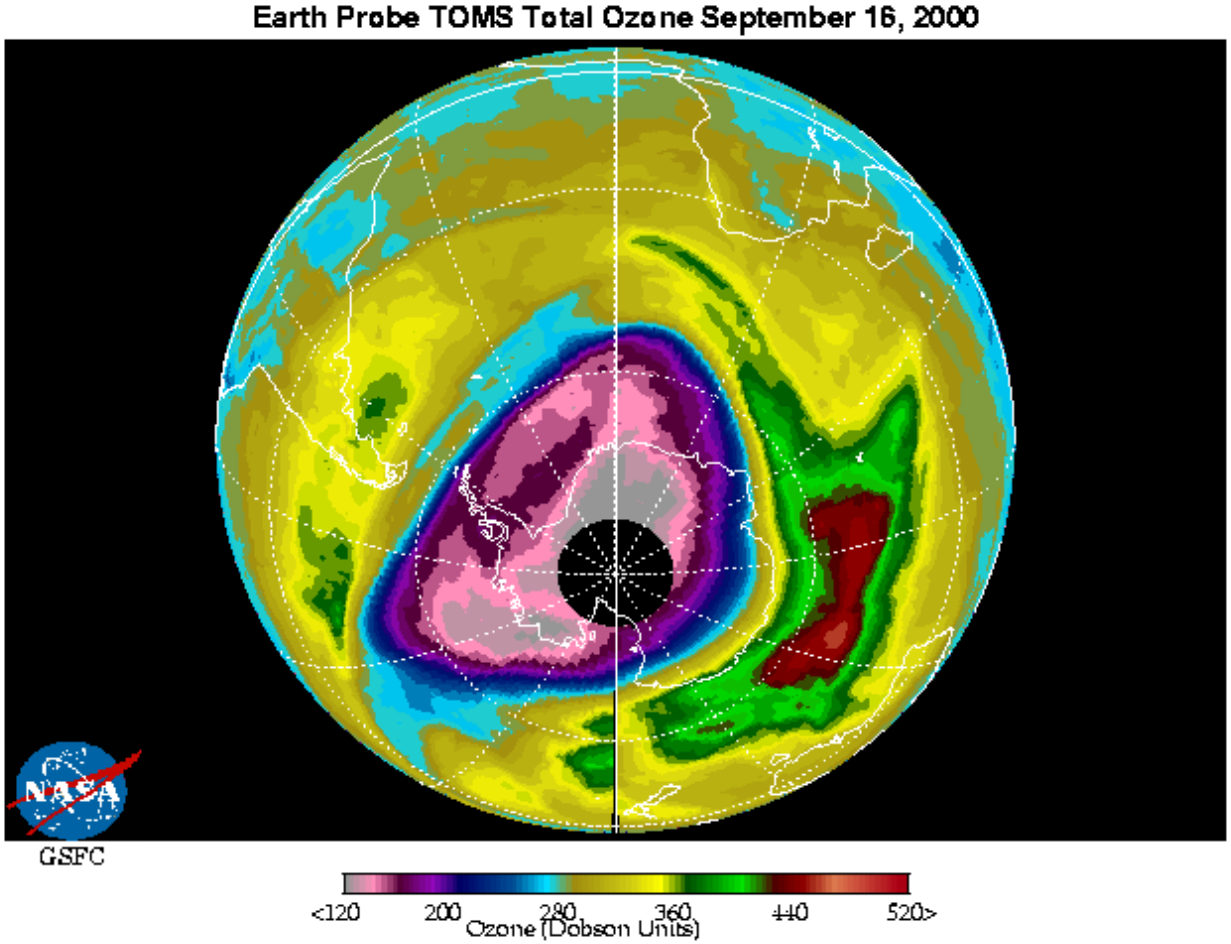
- Ethanol/gasoline dual-fuel vehicles (60)
- Compressed natural gas vehicles (3)
- Low-sulfur diesel vehicles (94)
- Researching storage of B-20 biodiesel/diesel blend
- Researching storage of E-85 ethanol/gasoline blend

Solutions

What can you do to decrease ground-level ozone and acid rain?

- Conserve energy at work!
- Purchase FFVs
- Properly maintain & operate vehicles
- Use biodiesel blends
- Use bioethanol blends
- Conserve energy at home!
- Carpool
- Telework
- Heed Ozone Action Days
- Eliminate waste (purchase smart)
- Segregate waste & recycle

The Other Ozone Issue: Stratospheric Ozone



Solutions

What is Fort Detrick doing to decrease stratospheric ozone?

Chiller

- Eliminating refrigerants having greatest ozone depletion potential
- Training

CFC Reclaiming

- Reclaiming and storing CFCs for reuse and turn-in
- Training

Solutions

What can you do to decrease elimination of stratospheric ozone?

Air condition only when necessary
Operate A/C on low fan speed
Buy only non-CFC products

VOCs and Air Toxics

Mercury

Chlorine

Benzene

Formaldehyde

Chromium

Cadmium

Solutions

What is Fort Detrick doing to eliminate VOCs and air toxics?

Incinerator Plant

- Waste reduction & segregation
- Recycling
- Scrubbers
- Mercury
- Chlorine (PVCs)
- Batteries
- Training

Landfill

- Best management practices to minimize methane emissions
- Waste segregation & reduction
- Recycling
- Training

Service Station

- Dispensing system vapor recovery
- 10% ethanol blend
- Training

Water and Wastewater Treatment Plants

- Proper chlorine gas storage
- Reducing water usage
- Training

Fuel Storage

- Vapor monitoring and recovery
- Observing deliveries
- Conserving energy

Solutions

What can you do
to eliminate VOCs and air toxics?

Reduce waste
Segregate waste and recycle
Buy environmentally-friendly products
Reduce energy usage – facilities & vehicles
Don’t top off your gasoline tanks

Enforcement

- In 1996, EPA assessed $2.5 million in administrative penalties for CAA violations
- May include civil penalties up to $25,000 per day per incident
- May include criminal penalties up to $250,000 or 15 years imprisonment or both

Odors

- Regulated through the EPA and States
- Most odor complaints concern large animal-farming operations

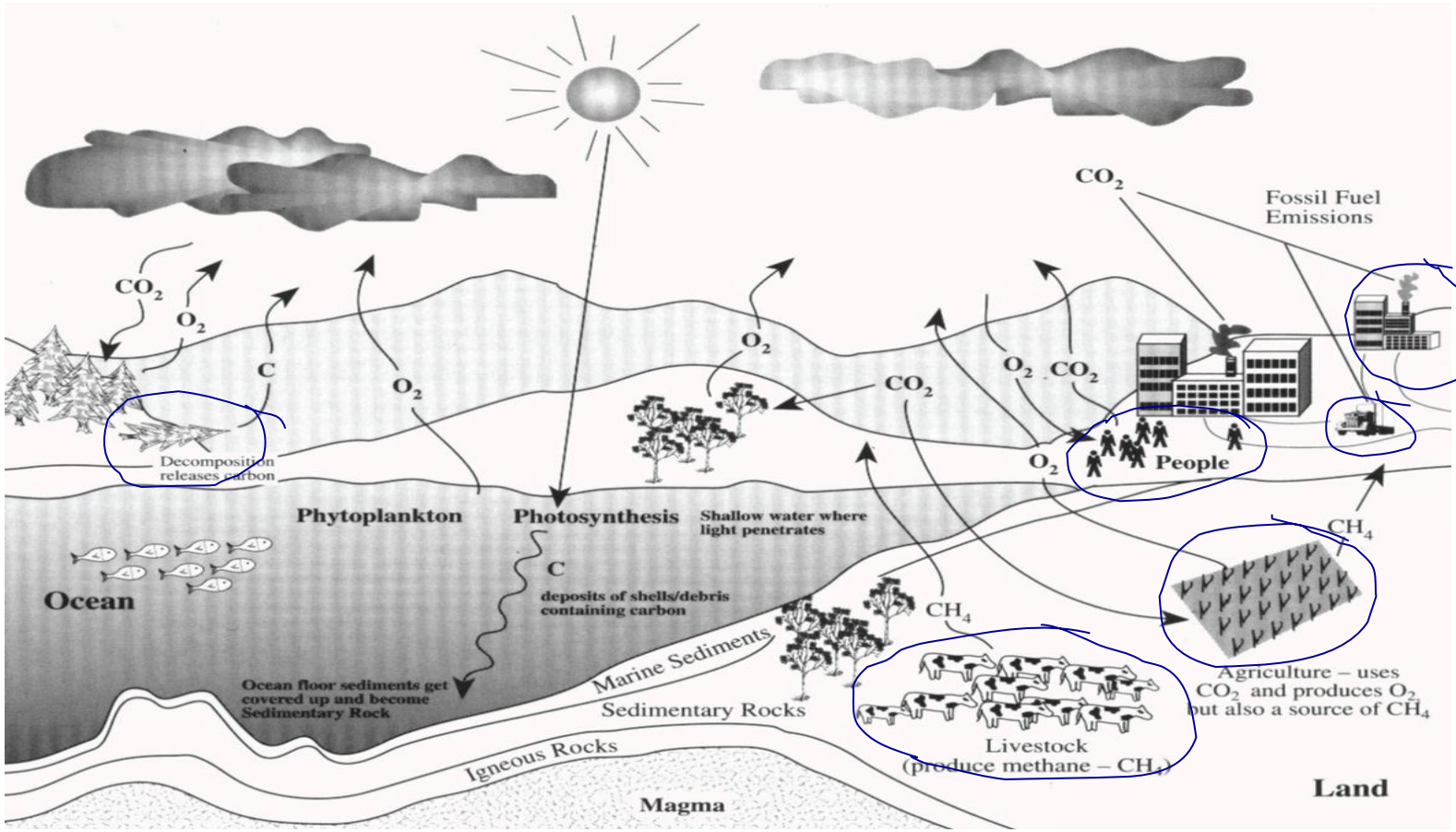
NCI Autoclaves

- Animal feed byproducts

Greenhouse Gases

Greenhouse Gas	Source(s)
CO_2	Combustion
CH_4	Landfills, coal mines, oil & gas production, agriculture
N_20	Combustion, fertilizers
HFCs and PFCs	Refrigeration, fire protection, semiconductors
Sulfur Hexafluoride	Circuit breakers, gas-insulated substations, switchgear

The Carbon Cycle



What can you do as an ECO?

Conserve energy – HVACR, lighting, vehicles, etc.

Minimize and segregate waste

Purchase smart: biofuels, consumables, etc.

Recycle

Encourage carpooling and teleworking

Share information